



# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P3S2004394	<b>FOR FURTHER ACTION</b>  See Form PCT/PEA/416	
International application No. PCT/JP2005/004736	International filing date (day/month/year) 10.03.2005	Priority date (day/month/year) 11.03.2004
International Patent Classification (IPC) or national classification and IPC INV. F02D41/02 F01N3/025 F02D41/12		
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand  25.11.2005	Date of completion of this report  02.03.2006	
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  De Vita, D  Telephone No. +49 89 2399-7008  	

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**Box No. 1 Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-24 as originally filed

**Claims, Numbers**

1-8 received on 25.11.2005 with letter of 25.11.2005

**Drawings, Sheets**

1/7-7/7 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☒ the claims, Nos. 1-8
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

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1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☒ the entire international application,

☐ claims Nos.

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos.

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form

☐ has not been furnished

☐ does not comply with the standard

the computer readable form

☐ has not been furnished

☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.

☐ See separate sheet for further details

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

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**Re Item V****Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following documents:

D1: EP 1 388 647

D2: EP 1 234 959

**INDEPENDENT CLAIM 1**

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (cf. fig. 1) an exhaust purifying apparatus 12, 13 for an internal combustion engine 1, the apparatus having a regeneration control section 20, wherein the regeneration control section controls regeneration of an exhaust purification catalyst through heating control 14, in which fuel is supplied to the exhaust purification catalyst, thereby increasing a bed temperature of the catalyst, wherein: a determining section that determines whether the vehicle is driving downhill, wherein the regeneration control section suspends the heating control when the determining section determines that the vehicle is driving downhill (cf. par. [0007]; par. [0014] to par. [0017]; par [0070]).

The subject-matter of claim 1 differs from this known exhaust purifying apparatus in that the regeneration control section suspends the heating control only when the determining section continuously determines for a predetermined period that the vehicle is driving downhill.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as an apparatus which eliminates problems due to deactivation of an exhaust purification catalyst during the heating control when the vehicle is driving downhill.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: the extra features of claim 1 are neither disclosed nor obviously suggested in its present form by any of the documents cited in the search report.

**INDEPENDENT CLAIM 8**

The same reasoning applies, mutatis mutandis, to the subject-matter of the

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corresponding independent claim 8, which therefore is also considered not new.

**DEPENDENT CLAIMS 2-7**

Claims 2-3, and 5-7 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

claim 4 was canceled with letter of 25.11.2005

The industrial applicability of the subject-matter claims 1 to 8 of the present application is evident (Article 33(4) PCT).

## CLAIMS

1. An exhaust purifying apparatus for an internal combustion engine on a vehicle, the apparatus having a regeneration control section, wherein the regeneration control section controls regeneration of an exhaust purification catalyst through heating control, in which fuel is supplied to the exhaust purification catalyst, thereby increasing a bed temperature of the catalyst, the apparatus further having:

10 a determining section that determining whether the vehicle is driving downhill,

wherein the regeneration control section suspends the heating control when the determining section determines that the vehicle is driving downhill,

15 the apparatus being characterized in that the regeneration control section suspends the heating control only when the determining section continuously determines for a predetermined period that the vehicle is driving downhill.

20 2. The apparatus according to claim 1, characterized in that the determining section determines that the vehicle is driving downhill when the amount of fuel injected by a fuel injection valve of the engine is equal to or less than a predetermined amount and the vehicle speed is equal to or greater than a predetermined speed.

3. The apparatus according to claim 2, characterized in that the determining section determines that the amount of fuel injected by the fuel injection valve is equal to or less than the predetermined amount when fuel cutoff control, in which fuel injection by the fuel injection valve is suspended, is being executed.

4. (canceled)

5. The apparatus according to any one of claims 1 to 3,

characterized in that, while the heating control is suspended due to determination of the determining section that the vehicle is driving downhill, the regeneration control section resumes the heating control if the determining section  
5 determines that the vehicle is not driving downhill.

6. The apparatus according to claim 5, characterized in that the regeneration control section resumes the heating control only when the determining section continuously  
10 determines for a predetermined period that the vehicle is not driving downhill.

7. The apparatus according to any one of claims 1 to 3, 5 and 6, characterized in that the heating control includes  
15 first heating control, in which the amount of fuel supplied to the exhaust purification catalyst is relatively small, and second heating control, in which the amount of fuel supplied to the exhaust purification catalyst is relatively large, wherein the regeneration control section suspends at least the  
20 second heating control when the determining section determines that the vehicle is driving downhill.

8. An exhaust purifying method for an internal combustion engine on a vehicle, the method including:  
25 supplying fuel to an exhaust purification catalyst to increase a bed temperature of the catalyst, thereby regenerating the exhaust purification catalyst;  
determining whether the vehicle is driving downhill; and  
suspending the supply of fuel to the exhaust  
30 purification catalyst when the vehicle is determined to be driving downhill,

the method being characterized in that the supply of fuel to the exhaust purification catalyst is suspended only when the vehicle is continuously determined for a  
35 predetermined period to be driving downhill.